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Declass Review by
NIMA/DOD

Gentlemen:

We are pleased to provide the sixth in a series of monthly Progress Reports covering the effort expended on subject contract during the period January 2, 1965 to February 1, 1965.

Clean Room Erection

A progress meeting was held at [redacted] premises on January 20, 1965, between [redacted] representatives, [redacted]

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[redacted] The meeting was called to discuss general progress and specific problems. The major problems discussed are summarized below.

Vacuum System. The central vacuum system did not appear to be of the type described in previous discussions and contained no "demand" system, in which the blower is automatically switched on, whenever an outlet is opened.

[redacted] stated he would call in the vendor representative for a review of the system.

The locating of the vacuum outlets in the floor instead of in the walls was queried, and it was learned that this location was agreed to very early in the program to avoid any problems that might arise due to clearance between the clean room walls and the building walls. [redacted] was assured that the outlets would be installed flush with the floor, sealed against leakage, and of a material and finish inert to photographic solutions.

A subsequent meeting with the vacuum system manufacturer led to an agreement that to permit the system to operate as a "demand" system, flush fitting push switches would be installed in the clean room walls adjacent to outlets in the floor.

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The system is completely installed except the recessing of the outlets into the floor, and the repositioning of a drain connection placed in an unacceptable location.

Removable Partition

25X1 In the opinion of [] the removable partition as designed could
25X1 not really be classed as removable, since the structure and the method of
assembly was the same as that of the main walls, and that its removal would
break the seals of the ceiling. [] agreed that this was correct, and promised
a modification to incorporate the top covings of the partition in the ceiling structure.

The modification has been effected, and removal of the partition can be accomplished without disturbing the ceiling.

Safe Lights

25X1 The [] safe lights are not Underwriter Laboratory approved, and as such,
could not be installed under the local code without approval being obtained.
A sample assembly was submitted and detailed changes requested. After these
changes were incorporated additional requirements of lock washers to all screws and
identification labels for the bulbs in each compartment were necessary. After
25X1 receipt of a letter from [] stating that this would be done, approval
was granted.

Floor Grilles

A discussion on floor grilles resulted in agreement that perforated plates would be satisfactory as long as a surround of flat plate was welded around the edges to prevent dirt traps from forming. It was also agreed to change the grille support to have a slope of thirty degrees and to provide a frame which would serve to hold the vinyl trim down.

The manufacture of the frames and grilles has commenced.

Air Conditioning

The main air conditioning units were delivered and mounted on the roof of the building. Due to the main duct connection not occurring where specified, the units were repositioned twenty-two inches east by extending the mounting platforms.

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A subsequent check with the contract architect confirmed that this repositioning was acceptable, and that the roof bracing provided required no changes.

The strip heaters are of special manufacture and a possible maximum delay of two weeks is anticipated in obtaining Underwriter's approval.

In general the progress in erection has been satisfactory. Causes of delay were the changes to the partition, safe light approval and delivery of clean air inlet grilles, all of which delayed assembly of the clean room ceilings. The air conditioning system as a whole is complete, except for the installation of the strip heaters, a few ceiling grilles, interconnecting ducts and the pneumatic control system.

Area Preparation

All major structural changes have been completed and plastering finished. Laying of floor covering, trimming and hanging of doors, painting and decorating will be commenced shortly.

After laying of floor tiles in the washroom, the plumbing contractors are scheduled to return and install all necessary fittings.

The electrical installation of circuits is completed. Delivery of the main breaker cabinet and transformer and distribution cabinets was made on January 15th. These are now installed, and conduit runs completed. Pulling of the heavy wiring from the main breaker to the distribution cabinets and beyond is now under way.

Completion

The scheduled completion date is February 19, 1965. [] stressed [] the importance of maintaining this date. [] stated that in spite of unexpected delays, he expected completion of erection ready for system check-out by mid February.

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RESEARCH PROGRAM

Film Drag Parameters.

The float test rig was transported to a marina where power and facilities were available. A number of test trials were made, but due to strong tides of varying direction, it became obvious that a body of still water was required. Changes to the test rig are also being made. A new location has been found and completion of the tests will be carried out shortly.

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A51-65-3147Liquid Bearings

The two types of liquid bearings described in last month's report were completed and mounted in test tanks. Modifications to improve the self-centering capability of the tapered sleeve bearing were found necessary, and tests are now in progress to measure its performance in terms of stable cushion, pressure, flow and load support capabilities.

The second type of liquid bearing, which has been named the [] consists of a support framework of circular section wire, in which paddle blades are rotated. On the ends of the paddle blade framework are vanes designed to draw solution in each end of the bearing and expel it out through the framework along the length of the bearing. Testing to date shows that the bearing has a high load lifting capacity at comparatively low R.P.M., and forms a satisfactory depth of cushion under a load of up to four pounds weight. On the problem side, the flow of fluid on one side of the bearing creates a turbulence which causes the partial collapse of the cushion on that side, causing the film to oscillate. Work is proceeding to eliminate this condition.

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The introduction of solid particles into the test tank during running of the bearing showed that turbulent movement of liquid extended to all boundaries of the tank.

Air Bearings

The tunnel type air bearing was completed and functioning tests commenced. A satisfactory cushion was obtained after balancing of the air flow between the two sides of the film had been obtained. Damping of the air release at the film inlet and outlet is necessary, however, to overcome oscillation of the film. A method of extending the sides of the film path to below the tank level is in work. Damping of the air release is expected to increase the air flow through the front and back relief holes, thereby stabilizing the film. Testing will continue.

Development of a [] type air bearing is under preliminary design study. Running of the liquid bearing suggests that at higher speeds sufficient air flow might be obtained to provide a support cushion. This possibility will not be pursued, however, until liquid tests are completed, to avoid any possible damage to bearings and liquid seals at the high R.P.M.

The use of a standard centrifugal blower squirrel cage wheel presents difficulty as a built-in power source, due to the limiting feature that at the given design speed, the width of the wheel should not exceed 0.6 (as a general rule) of the

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diameter, to obtain best efficiency. Various methods of "cheating" this restriction can be employed, such as the use of two wheels, but even flow characteristics become a serious problem over the length of bearing required, i.e. nine and one-half inches (9 1/2"). A new type of fan developed in Europe, and now becoming available here, shows promise for this application; this is the transverse flow fan. A conventional centrifugal blower draws in air axially and discharges it radially. The transverse flow fan draws its air radially inward and discharges it radially outward through a different section of the fan periphery. The advantage of incorporating this fan concept in an air bearing is that higher static pressures are obtainable for the same rotor diameter. (a pressure coefficient of 1.8 to 5.5 as against .60 to 1.10) and this over a length restricted only by structural considerations such as housing strength. A rough mock-up bearing using an available wheel of 1.8 inches width indicates that a blower can be part of the bearing. The main problems appear to be the air flow distribution over the required 9 1/2 inch length, which can be solved by using a transverse flow, and flutter of the film on one side of the bearing cage, caused by the direction of rotation of the wheel. Experimentation with flow baffles will be undertaken as a possible cure to this problem.

Modular Concept.

Design studies of a modular concept for a film processor is receiving particular attention. At this time, the solution module is under study. The design objective is to develop a standard module, specifically for a clean room environment, compact and self-contained in that no outside support for air or liquid bearings is required in the form of a service unit containing pumps, filters, heat exchangers, heater tanks, air blowers, etc. The modules are to be interchangeable and self-aligning, and in conjunction with a standard load and take-up module, will provide great functional flexibility, reliability and maintainability. One concept under study is that in which rails are used in the flooring on which the modules would be transported, e.g., a change in the processor build-up to handle color instead of black and white negative could be obtained by swinging aside the load end and tracking on the additional number of modules required. A control module for the processor is also under study.

Processing Criteria

Work is proceeding on the recording of processing data. In this project test exposures containing step wedges and resolution targets are made, and developed

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under conditions as controlled as possible by hand methods. Many problems have been encountered in the attempt to hold all conditions accurately from test to test. The processing method employed is adapted from A.S.A. PH 205, 1960, which requires that during development, the vessel be given an oscillating movement by tilting it from a vertical plane to an angle of about 45 degrees above, and below the horizontal. The rate required is about one complete cycle in one second while the vessel is revolved once in each five seconds of developing time.

This method produces varying results depending upon the degree of coordination and self-discipline employed by the different personnel. It is felt strongly that to reduce the number of replicate samples, a laboratory test sample developer should be designed and built to ensure consistency and reproducibility. It is hoped that approval will be given for this project in the near future. As the data from these tests is obtained and correlated, it will be incorporated into chart form to enable an operator to determine an expected quality from a selected development criteria. The criteria being obtained on a cross reference basis is as follows.

Time vs temperature
Gamma vs time and temperature
Resolution vs time and temperature
Fog density vs time and temperature
Granularity vs time and temperature

It is proposed to proceed with this research through all current aerial negative and dupe films through temperature ranges outside those published by the film manufacturers. To these results could be added the number of modules required for the film type to be processed at the resultant temperature and time (F.P.M.) obtained from the chart.

Funds committed or expended to date amount to If you should have any questions, or desire additional information, please feel free to contact us. 25X1

Very truly yours,

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